

CLAIMS

1. A novel microorganism belonging to genus Geobacillus, which has an ability to produce a solubilizing enzyme for solubilizing organic solid matter such as organic sludge or biological sludge.

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2. A novel microorganism belonging to genus Geobacillus, which has an ability to produce a solubilizing enzyme for solubilizing organic solid matter such as organic sludge or biological sludge and has the following mycological characteristics:

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A. Morphological characteristics

(1) Shape and size of cell: rod-shaped cell with a width of 0.7 to 0.8 μm and a length of 2.0 to 4.0 μm

(2) Presence or absence of motility: present

(3) Presence or absence of spore: present

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B. Cultivating characteristics (Nutrient agar plate culture)

(1) Colony morphology: circular, entirely smooth edge, low convex

(2) Color: cream color

(3) Gloss: present

C. Physiological characteristics

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(1) Gram staining property: +

(2) Nitrate reduction: —

(3) Indole production: —

(4) Hydrogen sulfide production: —

(5) Use of citric acid: —

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(6) Urease: —

(7) Oxidase: +

(8) Catalase: +

- (9) Attitude to oxygen: aerobic
- (10) O-F test (glucose): —/—
- (11) Production of acid and gas from saccharides
D-glucose: acid (+)/gas (—)

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3. A novel microorganism belonging to genus Geobacillus, which has an ability to produce a solubilizing enzyme for solubilizing organic solid matter such as organic sludge or biological sludge and has the following mycological characteristics:

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A. Morphological characteristics:

(1) Shape and size of cell: rod-shaped cell with a width of 0.7 to 0.8 μm and a length of 2.0 to 4.0 μm

(2) Presence or absence of motility: present

(3) Presence or absence of spore: present

15

B. Cultivating characteristics (Nutrient agar plate culture)

(1) Colony morphology: circular, entirely smooth edge, low convex

(2) Color: cream color

(3) Gloss: present

C. Physiological characteristics

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(1) Gram staining property: +

(2) Nitrate reduction: —

(3) Indole production: —

(4) Hydrogen sulfide production: —

(5) Use of citric acid: —

25

(6) Urease: —

(7) Oxidase: +

(8) Catalase: +

- (9) Attitude to oxygen: aerobic
- (10) O-F test (glucose): —/—
- (11) Production of acid and gas from saccharides
D-glucose: acid (+)/gas (—)
- 5 (12) Fermentability test
- (a) D-glucose: +
- (b) D-fructose: +
- (c) D-mannose: +
- (d) D-sorbitol: —
- 10 (e) Inositol: —
- (f) Maltose: +
- (g) Trehalose: +
- (13) Other physiological characteristics
- (a) β -Galactosidase activity: —
- 15 (b) Arginine dihydrolase activity: —
- (c) Lysine dicarboxylase activity: —
- (d) Tryptophan deaminase activity: —
- (e) Acetoin production: —
- (f) Gelatinase activity: +
- 20 (g) Ornithine dicarboxylase activity: —

4. The novel microorganism according to claim 1, which is Geobacillus sp. SPT4 (FERM BP-08452).

25 5. The novel microorganism according to claim 1, which is Geobacillus sp. SPT5 (FERM BP-08453).

6. The novel microorganism according to claim 1, which is Geobacillus sp. SPT6 (FERM BP-08454).

5 7. The novel microorganism according to claim 1, which is Geobacillus sp. SPT7 (FERM BP-08455).

8. A novel microorganism belonging to genus Geobacillus, which has an ability to produce a solubilizing enzyme for solubilizing organic solid matter such as organic sludge or biological sludge and has a base sequence of 16SrRNA gene as described in SEQ ID No. 1 in the sequence listing.

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9. A novel microorganism belonging to genus Geobacillus, which has an ability to produce a solubilizing enzyme for solubilizing organic solid matter such as organic sludge or biological sludge and has a base sequence of 16SrRNA gene as described in SEQ ID No. 2 in the sequence listing.

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10. A novel microorganism belonging to genus Geobacillus, which has an ability to produce a solubilizing enzyme for solubilizing organic solid matter such as organic sludge or biological sludge and has a base sequence of 16SrRNA gene as described in SEQ ID No. 4 in the sequence listing.

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11. A process for treatment of organic solid matter, in which organic solid matter such as organic sludge or biological sludge is solubilized by at least one novel microorganism according to any one of claims 1 to 10.

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12. A process for treatment of organic solid matter, in which organic solid matter such as organic sludge or biological sludge is solubilized by a mixture of

microorganisms comprising any one of the novel microorganisms according to claim 4, 5 or 6 and the novel microorganism according to claim 7.